TAXON: *Ludovia lancifolia Brongn.* SCORE: *-2.0* RATING: *Low Risk*

Taxon: Ludovia lancifolia Brongn. **Family:** Cyclanthaceae

Common Name(s): ludovia **Synonym(s):** Carludovica crenifolia Mart. ex Drude
Carludovica disticha Neumann
Carludovica lancifolia Hort. Paris ex H. Wend.
Ludovia crenifolia Drude

Assessor: Chuck Chimera **Status:** Approved **End Date:** 18 Jul 2023

WRA Score: -2.0 **Designation:** L **Rating:** Low Risk

Keywords: Tropical, Epiphyte, Unarmed, Ornamental, Animal-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y = -3, n = 0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	0 = low, 1 = intermediate, 2 = high (see Appendix 2)	High
202	Quality of climate match data	0 = low, 1 = intermediate, 2 = high (see Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y = 1, n = 0	n
204	Native or naturalized in regions with tropical or subtropical climates	y = 1, n = 0	y
205	Does the species have a history of repeated introductions outside its natural range?	y= -2, ? = -1, n = 0	?
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n = question 205	n
302	Garden/amenity/disturbance weed	y = 1*multiplier (see Appendix 2), n = 0	n
303	Agricultural/forestry/horticultural weed	y = 2*multiplier (see Appendix 2), n = 0	n
304	Environmental weed	y = 2*multiplier (see Appendix 2), n = 0	n
305	Congeneric weed	y = 1*multiplier (see Appendix 2), n = 0	n
401	Produces spines, thorns or burrs	y = 1, n = 0	n
402	Allelopathic		
403	Parasitic	y = 1, n = 0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y = 1, n = 0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y = 1, n = 0	n
408	Creates a fire hazard in natural ecosystems	y = 1, n = 0	n
409	Is a shade tolerant plant at some stage of its life cycle		

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y = 1, n = 0	n
412	Forms dense thickets	y = 1, n = 0	n
501	Aquatic	y = 5, n = 0	n
502	Grass	y = 1, n = 0	n
503	Nitrogen fixing woody plant	y = 1, n = 0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y = 1, n = 0	n
601	Evidence of substantial reproductive failure in native habitat	y = 1, n = 0	n
602	Produces viable seed	y = 1, n = -1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y = -1, n = 0	y
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y = 1, n = -1	n
702	Propagules dispersed intentionally by people	y = 1, n = -1	y
703	Propagules likely to disperse as a produce contaminant	y = 1, n = -1	n
704	Propagules adapted to wind dispersal	y = 1, n = -1	n
705	Propagules water dispersed		
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)	y = 1, n = -1	n
708	Propagules survive passage through the gut	y = 1, n = -1	y
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Leal, E. D. S., & Forzza, R. C. (2012). Cyclanthaceae in Para State, Brazil. Acta Botanica Brasilica, 26, 822-835	[No evidence] "Ludovia lancifolia is distributed in Colombia, Peru, Venezuela, Guyana, French Guiana and Suriname. In Brazil, occurs exclusively in the Amazon, in almost all states the northern region and Maranhão (Leal 2010). Second Harling (1958), the species grows along short courses of water in rain forests, being observed over logs or rocky outcroppings near wet locations. It flowers in April, August and October and bears fruit for almost every month of the year." [Translation from Portuguese]

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 13 Jul 2023]	"Native Southern America CENTRAL AMERICA: Panama [Colón, Panamá] NORTHERN SOUTH AMERICA: French Guiana, Guyana, Suriname, Venezuela [Bolívar, Amazonas] BRAZIL: Brazil [Acre, Amapá, Amazonas, Maranhão, Pará, Roraima] WESTERN SOUTH AMERICA: Colombia [Amazonas, Caquetá, Vaupés], Ecuador [Napo, Sucumbíos], Peru [Huánuco, Loreto]"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 13 Jul 2023]	"Native Southern America CENTRAL AMERICA: Panama [Colón, Panamá] NORTHERN SOUTH AMERICA: French Guiana, Guyana, Suriname, Venezuela [Bolívar, Amazonas] BRAZIL: Brazil [Acre, Amapá, Amazonas, Maranhão, Pará, Roraima] WESTERN SOUTH AMERICA: Colombia [Amazonas, Caquetá, Vaupés], Ecuador [Napo, Sucumbíos], Peru [Huánuco, Loreto]"

203	Broad climate suitability (environmental versatility)	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	KewScience. (2023). Plants of the World Online - Ludovia lancifolia. http://powo.science.kew.org. [Accessed 13 Jul 2023]	"Distribution Biogeografic region: Amazonia. Elevation range: 100-500 m a.s.l. Native to Colombia. Colombian departments: Amazonas, Caquetá, Vaupés."
	Top Tropicals. (2023). Ludovia lancifolia. https://toptropicals.com/catalog/uid/ludovia_lancifolia.htm. [Accessed 13 Jul 2023]	"In mild climates, this plant can be grown outdoors in zones 9-11, however due to its tropical origin, cold and frost will kill it. If grown in a pot, ensure it remains in indirect sunlight and bring it inside during cold winter months and frosty nights. If left outside, ensure the location is sheltered, and snow or frost cannot easily reach it."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	KewScience. (2023). Plants of the World Online - Ludovia lancifolia. http://powo.science.kew.org. [Accessed 13 Jul 2023]	"Distribution Biogeografic region: Amazonia. Elevation range: 100-500 m a.s.l. Native to Colombia. Colombian departments: Amazonas, Caquetá, Vaupés. Habit Herb, Hemiepiphyte. "
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2023). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 13 Jul 2023]	"Only found in cultivation"

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	**Notes**
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2023). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 17 Jul 2023]	"Only found in cultivation"
	Dave's Garden. (2023). Ludovia lancifolia. https://davesgarden.com/guides/pf/go/202628/. [Accessed 17 Jul 2023]	'This plant is said to grow outdoors in the following regions: Hawaiian Paradise Park, Hawaii Keaau, Hawaii Orchidlands Estates, Hawaii"

301	Naturalized beyond native range	n
	Source(s)	**Notes**
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2023). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 13 Jul 2023]	"Only found in cultivation"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	**Notes**
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2023). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 17 Jul 2023]	"Only found in cultivation"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2023). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 17 Jul 2023]	"Only found in cultivation"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	n
	Source(s)	**Notes**
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2023). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 17 Jul 2023]	"Only found in cultivation"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	CABI. (2023). Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabidigitallibrary.org/product/qi. [Accessed 17 Jul 2023]	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Gomes, F. P., & Mello-Silva, R. D. (2006). Flora da Reserva Ducke, Amazonas, Brasil: Cyclanthaceae. Rodriguésia, 57, 159-170	[Portugues. No evidence] "Herbácea, epífita, raro terrestre, até 150 cm compr.; raízes aéreas ausentes; raízes grampiformes muito abundantes formando um aglomerado na base da planta; caule ca. 40 cm compr., 3–7 cm diâm. Folhas 5–12, verdeescuras, brilhantes, eretas, bainha conduplicada, margens expandidas, 2–3 cm larg.; pecíolo (20–)25–35 cm. compr., alado; lâmina 25–75(–85) cm compr., 5,5–8(–11) cm larg., inteira, unicostada, lanceolada, ápice crenado, base atenuada; nervuras secundárias 6–10, proeminentes na face adaxial, impressas na face abaxial; profilo 1, membranáceo, muito rudimentar." [Translation: Herbaceous, epiphytic, rare terrestrial, up to 150 cm long.; aerial roots absent; very abundant grampiform roots forming a cluster at the base of the plant; stem ca. 40 cm long, 3–7 cm dia. Leaves 5–12, dark green, glossy, erect, sheath conduplicate, margins expanded, 2–3 cm wide; petiole (20–)25–35 cm. long, winged; blade 25–75(–85) cm long, 5.5–8(–11) cm wide, entire, unicostate, lanceolate, apex crenate, base attenuated; secondary veins 6–10, prominent on adaxial surface, imprinted on abaxial surface; profile 1, membranous, very rudimentary.]

Qsn #	Question	Answer
402	Allelopathic	
	Source(s)	Notes
	Gomes, F. P., & Mello-Silva, R. D. (2006). Flora da Reserva Ducke, Amazonas, Brasil: Cyclanthaceae. Rodriguésia, 57, 159-170	[Unknown. Epiphytic] "Herbaceous, epiphytic, rare terrestrial, up to 150 cm long" [Translation from Portuguese]

403	Parasitic	n
	Source(s)	Notes
	Kubitzki, K. (ed.). (1998). The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	[No evidence] "Root-climbing vines, epiphytes, or terrestrial herbs; branching monopodial. Leaves orthodistichous; leaf blades entire, unicostate. Peduncle usually short; spathes 3-5, dispersed in upper half of peduncle. Spadix cylindrical to somewhat fusiform; staminate flowers rather large, almost symmetrical, shortly pedicellate or sessile; perianth lobes 20-30, glanduliferous. Pistillate flowers and fruits entirely connate; tepals reduced, forming indistinct wales encircled by a broad mass of tissue; placentae 4, subapical; styles lacking."

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Forget, P. M., & Hammond, D. S. (2005). Rainforest vertebrates and food plant diversity in the Guiana Shield. Tropical Rainforest of the Guiana Shield (DS Hammond, ed.). CABI Publishing, 233-294	[Palatable to howler monkeys] "When restricted to highly disturbed, flooded forest remnants with leafless trees, an isolated troop of howler monkeys survived for some time by feeding exclusively on leaves of Araceae (Philodendron spp.) and Cyclanthaceae (Ludovia lancifolia) (de Thoisy and Richard-Hansen, 1997)."

405	Toxic to animals	n
	Source(s)	Notes
	Dave's Garden. (2023). Ludovia lancifolia. https://davesgarden.com/guides/pf/go/202628/. [Accessed 17 Jul 2023]	"Danger: N/A"
	Forget, P. M., & Hammond, D. S. (2005). Rainforest vertebrates and food plant diversity in the Guiana Shield. Tropical Rainforest of the Guiana Shield (DS Hammond, ed.). CABI Publishing, 233-294	[Palatable to howler monkeys] "When restricted to highly disturbed, flooded forest remnants with leafless trees, an isolated troop of howler monkeys survived for some time by feeding exclusively on leaves of Araceae (Philodendron spp.) and Cyclanthaceae (Ludovia lancifolia) (de Thoisy and Richard-Hansen, 1997)."
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes

Qsn #	Question	Answer
	Aristizábal, L. F., Cardona, L. V., Henao, E. R., Salgado, M., & Arthurs, S. P. (2013). Insects associated with tropical foliage produced in the coffee growing region of Colombia. Revista Brasileira de Entomologia, 57, 313-318	"The most frequently encountered hemipteran pests were leafhoppers (Cicadellidae), followed by squash bugs (Coreidae), stink bugs (Pentatomidae), treehoppers (Membracidae), soft scales (Coccidae), and other plant bugs (Fulgoridae and Miridae) (Fig. 1)." ... "Adult treehoppers of the genera Archasia and Stictocephala were observed feeding on stems and branches of Cordyline, Dracena, Ludovia, Phormium, Pittosporum, Viburnum and Eucalyptus." ... "The adult stages of two genera of long horn beetles (Cerambycidae) were observed feeding on Anthericum and Ludovia, although it is not known whether either plant species would be suitable as reproductive hosts." ... "Whilst most Hymenoptera were considered beneficial, adult leaf cutting ants (Atta and Acromyrmex spp.) were observed harvesting Anthericum, Cordyline, Dracaena, Ludovia, Pandanus, Phormium and Pittosporum for their fungal colonies."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Dave's Garden. (2023). Ludovia lancifolia. https://davesgarden.com/guides/pf/go/202628/. [Accessed 17 Jul 2023]	"Danger: N/A"
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Leal, E. D. S., & Forzza, R. C. (2012). Cyclanthaceae in Para State, Brazil. Acta Botanica Brasilica, 26, 822-835	[No evidence. An epiphyte of wet areas, unlikely to contribute significantly to fuel load] "the species grows along short courses of water in rain forests, being observed over logs or rocky outcroppings near wet locations." [Translation from Portuguese]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	Flora Fauna Web. (2023). Ludovia lancifolia. https://www.nparks.gov.sg/florafaunaweb/flora/6/7/6741. [Accessed 17 Jul 2023]	"Light Preference - Semi-Shade"
	Dave's Garden. (2023). Ludovia lancifolia. https://davesgarden.com/guides/pf/go/202628/. [Accessed 17 Jul 2023]	"Sun Exposure: Full Sun Sun to Partial Shade Light Shade"
	Top Tropicals. (2023). Ludovia lancifolia. https://toptropicals.com/catalog/uid/ludovia_lancifolia.htm. [Accessed 17 Jul 2023]	"This shrub prefers a sunny to semi-shady location but can also tolerate partial shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Top Tropicals. (2023). Ludovia lancifolia. https://toptropicals.com/catalog/uid/ludovia_lancifolia.htm. [Accessed 17 Jul 2023]	"For best results, Ludovia lancifolia requires regular watering. During the summer and spring, keeping the soil lightly moist is best, however, during the winter months, the plant should be watered less, about once a week, so that the soil remains just moist. Although it prefers regular, moderate waterings, the plant is highly tolerant of dry air, allowing it to thrive in both humid and dry climates."
	Dave's Garden. (2023). Ludovia lancifolia. https://davesgarden.com/guides/pf/go/202628/. [Accessed 17 Jul 2023]	"Soil pH requirements: 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral)"
	Leal, E. D. S., & Forzza, R. C. (2012). Cyclanthaceae in Para State, Brazil. Acta Botanica Brasilica, 26, 822-835	[Soil type may be unimportant when growing as an epiphyte] "Epiphyte up to 6 m high on the phorophyte, sometimes terrestrial," [Translation from Portuguese]

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Freiberg, M. & Gottsberger, G. (2001). Influence of climatic gradients on life form frequency of Cyclanthaceae in the reserve Naturelle des Nouragues, French Guiana. Life Forms and Dynamics in Tropical Forests, 141-151. J. Cramer in der GebrOder Borntraeger Verlagsbuchhandlung. Berlin - Stuttgart	[Epiphytic, but not smothering] "The only true epiphyte in the study area, growing in the upper canopy mainly in large branch bifurcations close to the trunk. Its leaves become ca. 1 m long, and 6-23 leaves were counted per plant. Individuals on horizontal branches may develop enormous baskets of more than 1 m width. Individuals attached to the main trunk often grow upwards like root climbers, with shoots reaching up to 2 m. Some individuals were found on the ground, obviously having fallen down from the upper canopy. L. lancifolia is the only of the species studied with entire leaves. It was reported to grow saxicolous on the Inselberg (COCKLE 1997), but it did not so in the plots of this transect."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Freiberg, M. & Gottsberger, G. (2001). Influence of climatic gradients on life form frequency of Cyclanthaceae in the reserve Naturelle des Nouragues, French Guiana. Life Forms and Dynamics in Tropical Forests, 141-151. J. Cramer in der GebrOder Borntraeger Verlagsbuchhandlung. Berlin - Stuttgart	"Fig. 3. Number of individuals (black bars corresponding to y-axis on the right) of Cyclanthaceae per 100 m2 in all study plots along the transect." [Ludovia lancifolia measured at densities of >250 to <300 plants per 100 m2, or >2 individuals per m2 as an epiphye, but not reported to form dense, monotypic cover on the ground.]

501	Aquatic	n
	Source(s)	**Notes**
	Freiberg, M. & Gottsberger, G. (2001). Influence of climatic gradients on life form frequency of Cyclanthaceae in the reserve Naturelle des Nouragues, French Guiana. Life Forms and Dynamics in Tropical Forests, 141-151. J. Cramer in der GebrOder Borntraeger Verlagsbuchhandlung. Berlin - Stuttgart	[Epiphytic] "The only true epiphyte in the study area, growing in the upper canopy mainly in large branch bifurcations close to the trunk. Its leaves become ca. 1 m long, and 6-23 leaves were counted per plant. Individuals on horizontal branches may develop enormous baskets of more than 1 m width. Individuals attached to the main trunk often grow upwards like root climbers, with shoots reaching up to 2 m. Some individuals were found on the ground, obviously having fallen down from the upper canopy. L. lancifolia is the only of the species studied with entire leaves. It was reported to grow saxicolous on the Inselberg (COCKLE 1997), but it did not so in the plots of this transect."

Qsn #	Question	Answer
502	Grass	n
	Source(s)	Notes
	Kubitzki, K. (ed.). (1998). The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	Cyclanthaceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Kubitzki, K. (ed.). (1998). The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	Cyclanthaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Gomes, F. P., & Mello-Silva, R. D. (2006). Flora da Reserva Ducke, Amazonas, Brasil: Cyclanthaceae. Rodriguésia, 57, 159-170	"Herbaceous, epiphytic, rare terrestrial, up to 150 cm long.; aerial roots absent; very abundant grampiform roots forming a cluster at the base of the plant" [Translation from Portuguese]
	Kubitzki, K. (ed.). (1998). The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	"Root-climbing vines, epiphytes, or terrestrial herbs; branching monopodial."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Leal, E. D. S., & Forzza, R. C. (2012). Cyclanthaceae in Para State, Brazil. Acta Botanica Brasilica, 26, 822-835	[No evidence] "Ludovia lancifolia is distributed in Colombia, Peru, Venezuela, Guyana, French Guiana and Suriname. In Brazil, occurs exclusively in the Amazon, in almost all states the northern region and Maranhão (Leal 2010). Second Harling (1958), the species grows along short courses of water in rain forests, being observed over logs or rocky outcroppings near wet locations. It flowers in April, August and October and bears fruit for almost every month of the year." [Translation from Portuguese]

602	Produces viable seed	y
	Source(s)	Notes
	Julliot, C. (1996). Seed dispersal by red howling monkeys (Alouatta seniculus) in the tropical rain forest of French Guiana. International Journal of Primatology, 17, 239-258	"I obtained germination delay and time needed to reach 50% of the total number of germination for 15 and 13 species, respectively, of the 17 tested species (Appendix). There is no significant difference between the two delays of first germination for 12 of 15 sample species, and between the two delays of 50% of germination for 11 of 13 sample species. We noted that the only species (Ludovia lancifolia) for which the passage through the digestive tract of monkeys decreases germination velocity, presented the longest delay of first germination (> 150 days) and the lowest rate of germination (7-8%) of any species, for the fecal sample as well as for the control sample. This could be due to the experimental conditions of the germination tests, which were probably ill adapted to the germination requirements of seeds of this species, the only epiphytic plant among the 17 species tested."

Qsn #	Question	Answer
	Dave's Garden. (2023). Ludovia lancifolia. https://davesgarden.com/guides/pf/go/202628/. [Accessed 17 Jul 2023]	"Seed Collecting: Unblemished fruit must be significantly overripe before harvesting seed; clean and dry seeds"

603	Hybridizes naturally	
	Source(s)	**Notes**
	Kubitzki, K. (ed.). (1998). The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	[Unknown. No evidence found] "Three spp., lowlands from Nicaragua to Peru, Brazil, and French Guiana."

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Kubitzki, K. (ed.). (1998). The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	[Unknown for Ludovia lancifolia] "Most species investigated have protogynous inflorescences, with short and simultaneous anthesis of the respective gender. They usually show a 2-day flowering rhythm, where the pistillate and staminate phases are distinctly separated. This condition ensures xenogamy, because usually only 1 inflorescence per genet is well developed at a time. Some species are, however, known to have overlapping pistillate and staminate antheses, and in these, geitonogamy is prevailing, promoted by visiting weevils as pollen vectors."

605	Requires specialist pollinators	y
	Source(s)	**Notes**
	Teichert, H. (2008). Pollination biology of cantharophilous and melittophilous Annonaceae and Cyclanthaceae in French Guiana. PhD Dissertation. University of Ulm, Ulm, Germany	"As other investigated Cyclanthaceae species, also Evodianthus funifer and Ludovia lancifolia are mainly pollinated by small weevils belonging to the tribe Derelomini (Coleoptera: Curculionidae) (Gottsberger 1991, Eriksson 1994, Franz 2007). The morphology of inflorescences of members of the Carludovicoideae allows only small beetles to be pollinators. This results from the small entrances to the reproductive pistillate flowers between the staminate flowers."

606	Reproduction by vegetative fragmentation	
	Source(s)	**Notes**
	Dave's Garden. (2023). Ludovia lancifolia. https://davesgarden.com/guides/pf/go/202628/. [Accessed 18 Jul 2023]	"Propagation Methods: By dividing rhizomes, tubers, corms or bulbs (including offsets)" [Unknown if plants spreads naturally by vegetative means]
	Freiberg, M. & Gottsberger, G. (2001). Influence of climatic gradients on life form frequency of Cyclanthaceae in the reserve Naturelle des Nouragues, French Guiana. Life Forms and Dynamics in Tropical Forests, 141-151. J. Cramer in der GebrOder Borntraeger Verlagsbuchhandlung. Berlin - Stuttgart	[Whole plants may detach and root on the ground. Unknown if vegetative fragmentation occurs] "The only true epiphyte in the study area, growing in the upper canopy mainly in large branch bifurcations close to the trunk. Its leaves become ca. 1 m long, and 6-23 leaves were counted per plant. Individuals on horizontal branches may develop enormous baskets of more than 1 m width. Individuals attached to the main trunk often grow upwards like root climbers, with shoots reaching up to 2 m. Some individuals were found on the ground, obviously having fallen down from the upper canopy."

Qsn #	Question	Answer
607	**Minimum generative time (years)**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	n
	Source(s)	**Notes**
	Gomes, F. P., & Mello-Silva, R. D. (2006). Flora da Reserva Ducke, Amazonas, Brasil: Cyclanthaceae. Rodriguésia, 57, 159-170	[No evidence. No means of attachment] "infructescence light green, changing to dark green when mature; peduncle (2−)3.5−8 cm long; spadix (3.5−)4−7.5 cm long, 1−2.5 cm dia.; connate tepals, very reduced, giving each fruit a hexagonal appearance. Seeds brown, globose, ca. 1−1.5 mm diam., forehead longitudinally grooved." [Translation form Portuguese]

702	**Propagules dispersed intentionally by people**	y
	Source(s)	**Notes**
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2023). Plants of Hawai'i. http://www.plantsofhawaii.org.. [Accessed 17 Jul 2023]	"Only found in cultivation"
	Top Tropicals. (2023). Ludovia lancifolia. https://toptropicals.com/catalog/uid/ludovia_lancifolia.htm. [Accessed 17 Jul 2023]	[Cultivated as an ornamental] "Though Ludovia lancifolia requires regular watering and some protection from cold weather, it is easy to grow and maintain and a perfect addition to your garden, porch, balcony, or indoor decor. Houseplant lovers and gardeners alike enjoy this unique and vibrant shrub, which has a unique palm-like appearance and can bring some tropical flair to any outdoor or indoor space. With proper growing and plant care, this plant can last for many years."

703	**Propagules likely to disperse as a produce contaminant**	n
	Source(s)	**Notes**
	Gomes, F. P., & Mello-Silva, R. D. (2006). Flora da Reserva Ducke, Amazonas, Brasil: Cyclanthaceae. Rodriguésia, 57, 159-170	[No evidence] "infructescence light green, changing to dark green when mature; peduncle (2−)3.5−8 cm long; spadix (3.5−)4−7.5 cm long, 1−2.5 cm dia.; connate tepals, very reduced, giving each fruit a hexagonal appearance. Seeds brown, globose, ca. 1−1.5 mm diam., forehead longitudinally grooved." [Translation form Portuguese]

704	**Propagules adapted to wind dispersal**	n
	Source(s)	**Notes**
	Gomes, F. P., & Mello-Silva, R. D. (2006). Flora da Reserva Ducke, Amazonas, Brasil: Cyclanthaceae. Rodriguésia, 57, 159-170	[No evidence] "infructescence light green, changing to dark green when mature; peduncle (2−)3.5−8 cm long; spadix (3.5−)4−7.5 cm long, 1−2.5 cm dia.; connate tepals, very reduced, giving each fruit a hexagonal appearance. Seeds brown, globose, ca. 1−1.5 mm diam., forehead longitudinally grooved." [Translation form Portuguese]

Qsn #	Question	Answer
705	Propagules water dispersed	
	Source(s)	Notes
	Leal, E. D. S., & Forzza, R. C. (2012). Cyclanthaceae in Para State, Brazil. Acta Botanica Brasilica, 26, 822-835	[An epiphyte, but water might sometimes disperse seeds in riparian areas] "the species grows along short courses of water in rain forests, being observed over logs or rocky outcroppings near wet locations." [Translation from Portuguese]

706	Propagules bird dispersed	
	Source(s)	Notes
	Kubitzki, K. (ed.). (1998). The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	[Family description. Ludovia lancifolia is reported to be dispersed by howler monkeys. It is unknown if birds also disperse the seeds] "DISPERSAL. On account of the often brilliantly coloured opened spadices it has repeatedly been assumed that the Cydanthaceae are dispersed by animals. The few actual observations on the Carludovicoideae refer to endozoochory by bats (Wilson 1971 fide Croat 1978; Hammel and Wilder 1989), monkeys (Hladik and Hladik 1969 fide Croat 1978; Terborgh fide Gentry and Dodson 1987), and birds (Olson and Blum 1968), explosive fruit dehiscence (Hammel 1986; G. Harling, unpubl.), passive flush dispersal or seeds germinating in the debris of old fallen inflorescences (Hammel and Wilder 1989; Eriksson 1995)."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Kubitzki, K. (ed.). (1998). The Families and genera of vascular plants. Volume III. Flowering plants, Monocotyledons: Lilianae (except Orchidaceae). Springer-Verlag, Berlin, Heidelberg, New York	[A related species is dispersed by ants, but there is no evidence that Ludovia lancifolia possesses any morphological adaptations for ant dispersal] "Certain taxa may also be dispersed by ants. Thus, Ludovia integrifolia has a distinct caruncle on the seed, and ants have been observed to visit the fragmenting infructescence of Cyclanthus bipartitus (Harling 1958)."

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Julliot, C. (1996). Seed dispersal by red howling monkeys (Alouatta seniculus) in the tropical rain forest of French Guiana. International Journal of Primatology, 17, 239-258	[Dispersed by howler monkeys, but germination time and number are reduced] "I obtained germination delay and time needed to reach 50% of the total number of germination for 15 and 13 species, respectively, of the 17 tested species (Appendix). There is no significant difference between the two delays of first germination for 12 of 15 sample species, and between the two delays of 50% of germination for 11 of 13 sample species. We noted that the only species (Ludovia lancifolia) for which the passage through the digestive tract of monkeys decreases germination velocity, presented the longest delay of first germination (> 150 days) and the lowest rate of germination (7-8%) of any species, for the fecal sample as well as for the control sample. This could be due to the experimental conditions of the germination tests, which were probably ill adapted to the germination requirements of seeds of this species, the only epiphytic plant among the 17 species tested."
	Pouvelle, S., Jouard, S., Feer, F., Tully, T., & Ponge, J. F. (2009). The latrine effect: impact of howler monkeys on the distribution of small seeds in a tropical rain-forest soil. Journal of Tropical Ecology, 25(3), 239-248	[Vaible seeds dispersed by howler monkeys] "Table 1. Species names and taxonomic classification of plants found in soil seed samples." [Ludovia lancifolia - Viable seeds detected in sleeping sites]

801	Prolific seed production (>1000/m2)	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Gomes, F. P., & Mello-Silva, R. D. (2006). Flora da Reserva Ducke, Amazonas, Brasil: Cyclanthaceae. Rodriguésia, 57, 159-170	[Seed numbers unknown] "infructescence light green, changing to dark green when mature; peduncle (2−)3.5−8 cm long; spadix (3.5−)4−7.5 cm long, 1−2.5 cm dia.; connate tepals, very reduced, giving each fruit a hexagonal appearance. Seeds brown, globose, ca. 1−1.5 mm diam., forehead longitudinally grooved."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

803	Well controlled by herbicides	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

Summary of Risk Traits:

Ludovia lancifolia is an herbaceous epiphytic, or rarely terrestrial plant, ranging from 2-5 feet in height, native to Central and South America. In its native range, it is reported to be dispersed by howler monkeys, and perhaps other frugivorous animals. It has a unique feather-like leaf pattern, made up of green and yellow stripes, and produces cream-colored blooms. It is often grown as a houseplant and planted in outdoor gardens due to its distinctive foliage but is not reported to be naturalized or invasive anywhere it has been cultivated.

High Risk / Undesirable Traits
• Adapted to, and could spread, in regions with tropical climates.
• May reach high densities and compete with native epiphytes.
• Reproduces by seeds
• Seeds dispersed by howler monkeys, and perhaps other frugivorous animals.
• Dispersed through intentional cultivation.
• Distribution along water courses suggests water may play a role in secondary dispersal.
• Gaps in biological and ecological information may reduce accuracy of risk prediction.

Low Risk Traits
• No reports of naturalization or invasiveness, but unclear how widespread it has been cultivated outside of its native range.
• Unarmed (no spines, thorns, or burrs)
• Foliage and fruit palatable to howler monkeys (and perhaps other browsing animals).
• Non-toxic